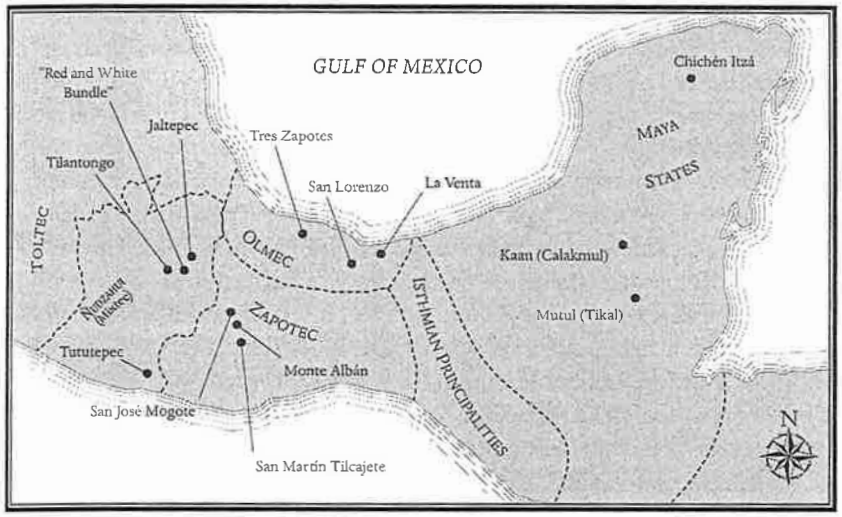
envisioned an imperium that spanned much of southern Mexico, proselytizing its religion and forcing other groups to send their finest works to its heartland. The Olmec, he thought, were the Romans of Mesoamerica, a magisterial society that "established the pattern which, through the centuries, was to be followed by other expansionist Mesoamerican cultures."

Since Bernal's death many researchers have come to view the Olmec differently. According to the University of Michigan anthropologists Kent Flannery and Joyce Marcus, the Olmec heartland was but one of four regional power centers: the Central Basin to the north, where settlements like Tlatilco and Tlapacoya laid the groundwork for the empires of Teotihuacan and the Toltecs; in the isthmus, the chiefdoms of Oaxaca; the Olmec, along the Gulf Coast; and, later, the Maya polities in Yucatán and northern Guatemala. Some believe that there was a fifth power: Chalcatzingo, an important chiefdom between the Central Basin and Oaxaca.

In the first millennium B.C., all four (or five) were making the transition from individual fortified villages to groups of chiefdoms to states with centralized authority. Although the Olmec preceded the others, they did not set the template for them. Instead they all influenced each other, sometimes by trade, sometimes by violence, each one developing new techniques, exporting unique goods, and swiping ideas from the others. In this world of "competitive interaction," all parties hustled for advantage. Trade in goods was important, but it was the trade in ideas that mattered.

By making this argument, I am endorsing one side in the long-running dispute between mother- and sister-culture proponents. In other words, as one mother-culture advocate put it, I am "swallowing Marcus's [nonsense] whole." He may be right. But I would argue that there is a difference between *inheriting* a cultural tradition, as the Norte Chico culture's successors apparently did, and *copying* one, as the Olmec's proponents argue. Nobody disputes that Han Chinese society arose long before its neighbors in Asia, but Asian archaeologists don't refer to China as Asia's "mother culture," because China's neighbors used part of its intellectual legacy to build up their own distinct and different writing systems, agricultural technologies, imperial practices, and much else. Given the evidence available now, the same seems to be true for the Olmec and ancient Mesoamerica. (To me, anyway—many researchers disagree.)






MESOAMERICA, 1000 B.C.–1000 A.D.
For thousands of years Mesoamerica was a wellspring of cultural innovation and growth. This map does not depict it accurately, because these societies were not contemporaries—the Olmec vanished centuries before the Ñudzahui and Zapotec began to reach their height, for example. Nonetheless, it should give some idea of each society's heartland.

Emblematic of this rocketing growth were the Olmec's neighbors in Oaxaca, the Zapotec, whom Flannery and Marcus have studied for more than two decades. The Zapotec were based across the mountains from the Olmec, in Oaxaca's high Central Valley—three forty-to-sixty-mile-long bowls that intersect in a ragged Y. By about 1550 B.C., they were abandoning the life of hunting and gathering to live in villages with defensive palisades.* These early villages had wattle-and-daub houses, fine pottery, and some public architecture. They were controlled by "big men," the social scientist's term for the alpha male who is able in such informal settings to enforce his will through persuasion or force. Within a few hundred years, the big men acquired

*Here, as elsewhere in this book, I am being chronologically inexact. The oldest Zapotec palisade Flannery and Marcus excavated yielded calibrated radiocarbon dates in the range between 1680 and 1410 B.C., which for brevity's sake I render as "about 1550 B.C."

*rank*—that is, they began to wield power not only because of their personal charisma, but also because their societies had given them an elevated official position. It is the difference between the leading spirit on a pickup basketball team and the officially selected captain of a college squad. After this, political consolidation proceeded apace. Soon the valley was dominated by three main chiefdoms, one at each endpoint of the Y. They did not get along; a thirty-square-mile buffer zone in the middle, Flannery and Marcus noted, was "virtually unoccupied."

The biggest of the three chiefdoms was located near today's village of San José Mogote. Around 750 B.C. it was attacked and its temple razed in a fire so intense that the clay walls melted. San José Mogote quickly rebuilt the temple a few yards away.

Across the new threshold artisans laid a carved stone. Splayed across its face, suitable for stomping on, was a bas-relief of a naked, disemboweled male corpse, apparently a defeated enemy, blood welling from his side. The carving, to my taste, is beautifully done, as graphically elegant, despite the gory subject matter, as a Matisse. What matters most to researchers, though, is not the design but the two curious marks between the cadaver's feet. The two marks are glyphs: the oldest firmly dated writing in the Americas. Despite their brevity, they are full of information, both because of the nature of written language, and because of the special way Mesoamerican people chose their names.

## COUNTING AND WRITING

Writing begins with counting. When a culture grows big enough, it acquires an elite, which needs to monitor things it considers important: money, stored goods, births and deaths, the progression of time. In the Fertile Crescent, village accountants began keeping records with clay tokens around 8000 B.C. As the need for precision grew, they scratched marks on the tokens as mnemonic devices. For example, they might have distinguished a count of sheep from one of wheat by drawing a sheep on one and a wheat stalk on the other. Gradually the information on each record increased. The bureaucrats were not intending to create writing. Instead they were simply adding useful features as they became necessary. By 3200 B.C. Sumerian scribes had progressed to inscribing on clay tablets with sharpened reeds. A tablet might contain, say, two hash marks, a box, a circle with a cross in the middle, an asterisk-like shape, and an arrangement of three triangles. Scribes would know that the hash marks meant "two," the box was a "temple," the circle stood for "cattle," an asterisk meant "goddess," and the triangles were "Inanna"—two cattle owned by the goddess Inanna's temple. (Here I am lifting an example from Gary Urton, a Harvard anthropologist.) They had no way to indicate verbs or adjectives, no way to distinguish subject from object, and only a limited vocabulary. Nonetheless, Sumerians were moving toward something like writing.



In Mesoamerica, timekeeping provided the stimulus that accounting gave to the Middle East. Like contemporary astrologers, the Olmec, Maya, and Zapotec believed that celestial phenomena like the phases of the moon and Venus affect daily life. To measure and predict these portents requires careful sky watching and a calendar. Strikingly, Mesoamerican societies developed *three* calendars: a 365-day secular calendar like the contemporary calendar; a 260-day sacred calendar that was like no other calendar on earth; and the equally unique Long Count, a one-by-one tally of the days since a fixed starting point thousands of years ago. Establishing these three calendars required advances in astronomy; synchronizing them required ventures into mathematics.

The 260-day ritual calendar may have been linked to the orbit of Venus; the 365-day calendar, of course, tracked the earth's orbit around the sun. Dates were typically given in both notations. For example, October 12, 2004, is 2 Lamat 11 Yax, where 2 Lamat is the date in the ritual calendar and 11 Yax the date in the secular calendar. Because the two calendars do not have the same number of days, they are not synchronized; the next time 2 Lamat occurs in the sacred calendar, it will be paired with a different day in the secular calendar. After October 12, 2004, in fact, 2 Lamat and 11 Yax will not coincide again for another 18,980 days, about fifty-two years.

Mesoamerican cultures understood all this, and realized that by citing dates with both calendars they were able to identify every day in this fifty-two-year period uniquely. What they couldn't do was distinguish one fifty-two-year period from another. It was as if the Christian calendar referred to the year only as, say, '04—one would then be

unable to distinguish between 1904, 2004, and 2104. To prevent confusion, Mesoamerican societies created the third calendar, the Long Count. The Long Count tracks time from a starting point, much as the Christian calendar begins with the purported birth date of Christ. The starting point is generally calculated to have been August 13, 3114, B.C., though some archaeologists put the proper date at August 10 or 11, or even September 6. Either way, Long Count dates consisted of the number of days, 20-day "months," 360-day "years," 7,200-day "decades," and 144,000-day "millennia" since the starting point. Archaeologists generally render these as a series of five numbers separated by dots, in the manner of Internet Protocol addresses. Using the August 13 starting date, October 12, 2006, would be written in the Long Count as 12.19.13.12.18. (For a more complete explanation, see Appendix D.)

Because it runs directly from 1 B.C. to 1 A.D., the Christian calendar was long a headache for astronomers. Scientists tracking supernovae, cometary orbits, and other celestial phenomena would still have to add or subtract a year manually when they crossed the A.D.-B.C. barrier if a sixteenth-century astronomer named Joseph Scaliger hadn't got sick of the whole business and devised a calendar for astronomers that doesn't skip a year. The Julian calendar, which Scaliger named after his father, counts the days since Day 0. Scaliger chose Day 0 as January 1, 4713, B.C.; Day 1 was January 2. In this system, October 12, 2006, is Julian Day 2,454,021.

The Long Count calendar began with the date 0.0.0.0.0.* Mathematically, what is most striking about this date is that the zeroes are true zeroes. Zero has two functions. It is a number, manipulated like other numbers, which means that it is differentiated from nothing. And it is a placeholder in a positional notation system, such as our

*Actually, it didn't. Inexplicably, the biggest unit, the 144,000-day "millennium," began with 13, rather than 0. The first day in the calendar was thus 13.0.0.0.0. When I remarked on the peculiarity of this exception to a mathematician, he pointed out societies whose timekeeping systems are so irregular that children have to learn rhymes to remember the number of days in the months ("Thirty days hath September . . .") are in no position to scoff at the calendrical eccentricities of other cultures. At least all the "months" in the Mesoamerican calendar had the same number of days, he said.



base-10 system, in which a number like 1 can signify a single unit if it is in the digits column or ten units if it is in the adjacent column.

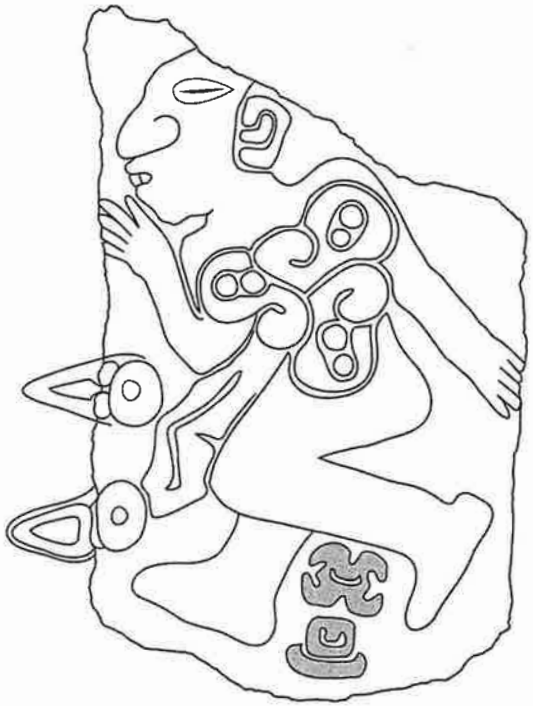
That zero is not the same as nothing is a concept that baffled Europeans as late as the Renaissance. How can you calculate with nothing? they asked. Fearing that Hindu-Arabic numerals—the 0 through 9 used today—would promote confusion and fraud, some European authorities banned them until the fourteenth century. A classic demonstration of zero's status as a number, according to science historian Dick Teresi, is grade point average:

> In a four-point system, an A equals 4, B equals 3, and so on, down to E, which equals 0. If a student takes four courses and gets A's in two but fails the other two, he receives a GPA of 2.0, or a C average. The two zeroes drag down the two A's. If zero were nothing, the student could claim that the grades for the courses he failed did not exist, and demand a 4.0 average. His dean would laugh at such logic.

Without a positional notation system, arithmetic is tedious and hard, as schoolchildren learn when teachers force them to multiply or subtract with Roman numerals. In Roman numerals, CLIV is 154, whereas XLII is 42. Maddeningly, both numbers have L (50) as the second symbol, but the two L's aren't equivalent, because the second is modified by the preceding X, which subtracts ten from it to make forty. Even though both CLIV and XLII are four-digit numbers, the left-hand symbol in the first number (C) cannot be directly compared with the left-hand symbol in the second (X). Positional notation symbols take the aggravation out of arithmetic.

Stirling's stela in Tres Zapotes bore a Long Count date of 7.16.6.16.18. The implication is that by 32 B.C. the Olmec already had all three calendars and zero to boot. One can't be sure, because the date does not include a zero or a reference to the other calendars. But it is hard to imagine how one could have a Long Count without them. Tentatively, therefore, archaeologists assign the invention of zero to sometime before 32 B.C., centuries ahead of its invention in India.

How long before 32 B.C.? The carved cadaver in San José Mogote may give a hint. In Mesoamerican cultures, the date of one's birth was such an important augury of the future that people often acquired



Discovered in 1975, this prone, disemboweled man was carved onto the stone threshold of a temple in San José Mogote, near the city of Oaxaca. Between the corpse's feet is the oldest certainly dated writing in the Americas: two glyphs (shaded in drawing) that probably represent his name, 1-Earthquake. The ornate scroll issuing from his side is blood. According to Joyce Marcus, the first archaeologist to examine this bas-relief, the Zapotec words for "flower" and "sacrificial object" are similar enough that the flowery blood may be a visual pun.

that day as their name. It was as if coming into the world on New Year's Day were such a sign of good fortune that children born on that day would be named "January 1." This seems to have been the case for the man whose death was celebrated in the San José Mogote temple. Between his feet are two glyphs, one resembling a stovepipe hat with a U painted across the front, the other looking vaguely like a smiling pet monster from a Japanese cartoon. According to Marcus, the Michigan anthropologist, the glyphs correspond to 1-Earthquake, the



Zapotec name for the seventeenth day of the 260-day sacred calendar. Because the carving depicts a man instead of an event, the date is generally thought to be the dead man's name. If so, 1-Earthquake is the first named person in the history of the Americas. Even if the date is not a name, the two glyphs indicate that by 750 B.C., when the slab was carved, the Zapotec were not only on the way to some form of writing, but had also assembled some of the astronomical and mathematical knowledge necessary for a calendar.

To judge by the archaeological record, this development took place in an astonishingly compressed period; what took the Sumerians six thousand years apparently occurred in Mesoamerica in fewer than a thousand. Indeed, Mesoamerican societies during that time created more than a dozen systems of writing, some of which are known only from a single brief text. The exact chronology of their evolution remains unknown, but could be resolved by the next object that a farmer discovers in a field. The earliest known Olmec writing, for example, is on a potsherd from Chiapas that dates from about 300 B.C. For a long time nobody could read it. In 1986 a workcrew building a dock on the Acula River in Veracruz pulled out a seven-foot stela covered with Olmec symbols. Thought to have been written in 159 A.D., the twenty-one columns of glyphs were the first Olmec text long enough to permit linguists to decipher the language. Two linguists did just that in 1993. The stela recounted the rise of a warrior-king named Harvest Mountain Lord who celebrated his ascension to the throne by decapitating his main rival during the coronation. This information in hand, the linguists went back to the writing on the potsherd. Disappointingly, it turned out to be some banal utterances about dying and cutting cloth.

## FROM 1-EARTHQUAKE TO 8-DEER

The development of writing in Zapotec society went hand-in-hand with growing urbanization. In about 500 B.C., San José Mogote seems to have transplanted itself to Monte Albán, in the middle of the buffer zone. About half an hour by bus from Oaxaca City, Monte Albán is today a decorous sprawl of walls and pyramids enveloped by a lush lawn (this last is an import from Europe; lawn grass did not

exist in the Americas prior to Columbus). Arriving tourists are hailed by "guides" with backpacks full of phony ancient figurines and ethnically incorrect souvenirs of Mexica drawings. Their ministrations do not diminish the lonely dignity of the ruins. Monte Albán is atop a steep, 1,500-foot hill that overlooks the valley of Oaxaca. The Zapotec reconfigured the entire hill to build the city, slicing out terraces and platforms. By leveling the entire summit, they created a fifty-five-acre terrace half the size of the Vatican. At its zenith, Monte Albán housed seventeen thousand people and was by a considerable margin the biggest and most powerful population center in Mesoamerica.

The rationale for its construction is the subject of yet another lengthy archaeological dispute. One side proposes that Monte Albán formed because maize agriculture allowed the Oaxaca Valley's population to grow so much that the rural villages naturally clustered into something resembling cities. For most of its history Monte Albán was thus a huge village, not a true city, and certainly not a hierarchical state. Others argue that warfare had grown so devastating, as shown by the destruction of San José Mogote, that the main valley chiefdoms formed a defensive confederation headquartered at Monte Albán. Yet a third theory is that the Zapotec of Monte Albán—not the Olmec of La Venta—consolidated to form North America's first imperialist power, an aggressive state that subjugated dozens of other villages.

Among the strongest evidence for the last view are the nearly three hundred carved stone slabs at Monte Albán that depict slain, mutilated enemies: the rulers, Marcus believes, of communities conquered by Monte Albán. Some of the stones are labeled with enemy names, as with the unfortunate 1-Earthquake. These may commemorate victories in Monte Albán's grinding battle for supremacy with its local rival, San Martín Tilcajete, in the southern arm of the Central Valley. When San José Mogote founded Monte Albán, Tilcajete responded by gathering people from its surrounding villages, doubling in size, and erecting its own ceremonial buildings. War was the inevitable result. Monte Albán sacked Tilcajete in about 375 B.C. Undiscouraged, Tilcajete rebuilt itself on a better defensive position and acquired larger armies. When it again became a threat, Monte Albán attacked for the second time in 120 B.C. This time its forces finished the job. They burned the king's palace to the ground and emptied the rest of Tilcajete, leaving Monte Albán firmly in control of the entire valley.



With nothing to impede it, Monte Albán swept out and established a domain of almost ten thousand square miles. For centuries it stood on equal ground with its neighbors, the rising Maya states to the east and Teotihuacan to the north. It enjoyed relatively peaceful relations with both but had continual trouble with the Ñudzahui (pronounced "nu-sa-wi"—Spaniards called them the Mixtec), a constellation of petty principalities immediately to the west. By contrast with Monte Albán, these were minuscule entities; most were clusters of rustic villages covering ten to twenty square miles. Yet they were amazingly troublesome. Monte Albán repeatedly overran the Ñudzahui statelets, but never managed to eliminate them. These tiny, fractious domains endured for more than a thousand years. Meanwhile the much stronger and more centralized Zapotec empire collapsed completely in about 800 A.D.

Ñudzahui writing survives in eight codices, the deerskin or bark "books" whose painted pages could be folded like screens or hung on the wall like a mural. (The Spaniards destroyed all the rest.) More purely pictorial than Zapotec or Maya script, the texts were arranged almost randomly on the page; red lines directed the reader's eye from image to image. The symbols included drawings of events, portraits labeled by name (the king 4-Wind, for example, being shown by symbolic wind and four little bubbles in a line), and even punning rebuses. Enough writing has survived to give, when coupled with archaeological studies, a vivid picture of Ñudzahui life.

Like medieval Italian city-states, Ñudzahui principalities were rigidly stratified, with the king and a small group of kinspeople and noble advisers gobbling up much of the wealth and land. They constantly shifted configuration, some expanding by swarming over their neighbors, others imploding when their constituent villages seceded and joined other polities. More commonly, two states joined when their rulers married. Alliance through royal marriage was as common in eleventh-century Mixteca as it was in seventeenth-century Europe. In both, royal family trees formed an intricate network across national boundaries, but in Mixteca the queen's lands stayed in her line—the king's heir wasn't necessarily the queen's heir. Another difference: primogeniture was not expected. If the queen did not think her eldest

son was fit for the crown, she could pass it to another child, or even to a nephew or cousin.

No fewer than four of the codices treat the story of 8-Deer Jaguar Claw, a wily priest-general-politician with a tragic love for the wife of his greatest enemy. Born in 1063 A.D., 8-Deer was a shirttail cousin to the ruling family of Tilantongo, which had been engaged for decades in a dynastic struggle with the kingdom of Red and White Bundle. (The name, a modern invention, comes from its name-glyph, which pictures the cloth wrapping used by the Ñudzahui to wrap holy objects; its exact location is still not nailed down.) Like his father, a high cleric, 8-Deer was trained for the priesthood, but political events and his own overweening ambition stopped him from following that path.

After an unprovoked attack on Red and White Bundle by Tilantongo raised hostilities to a fever, the warring parties agreed to meet in a sacred mountain cave with the Priestess of the Dead, a powerful oracle who had stripped away the flesh from her jaw, giving her a terrifying, skull-like appearance. Tilantongo's representative was 8-Deer, who attended the meeting in place of his recently deceased father. To his dismay, the priestess sided with Tilantongo's enemies and ordered 8-Deer, Tilantongo's champion, to exile himself a hundred miles away, in a jerkwater town on the Pacific called Tututepec.

Tucked away in Tututepec, 8-Deer assembled a private army, staffed it with many relatives, and in a series of swift campaigns seized dozens of neighboring villages and city-states. In addition to assembling the greatest empire ever seen in the region, the conquests managed to kill off most of the siblings and cousins above him in the line of royal succession. After six years of war he returned home to Tilantongo. During this visit, according to John M. D. Pohl, the archaeologist whose interpretations I am mostly following here, 8-Deer accidentally encountered 6-Monkey, the young wife of the much older king of Red and White Bundle. Despite the long enmity between the two kingdoms, 8-Deer and 6-Monkey secretly became lovers.

In 1096 Tilantongo's sovereign died in mysterious circumstances. The Priestess of the Dead selected 8-Deer's beloved elder half brother to be the regent—that is, the half brother became the last person between 8-Deer and the throne of Tilantongo. Three years later,

In this fragment from a Ñudzahui codex, the jaguar-cowled Lord 8-Deer (right) captures 4-Wind, son of his former lover, by the hair. As in other Ñudzahui codices, the characters' names are indicated by the accompanying circles-plus-head symbols.

unknown assailants stabbed the half brother to death in a sweatbath. The inconsolable 8-Deer took the throne of Tilantongo and declared war on Red and White Bundle, which he claimed had orchestrated the murder.

Red and White Bundle's royal palace was built on a cliff over a bend in the river. Guarded by sheer walls on three sides, its soldiers had only to watch the fourth side, across which was an earthen berm. Leading an army of a thousand, 8-Deer threw up ladders, swarmed over the berm with his men, and entered the palace. As befit a conqueror, 8-Deer was wearing elaborate cotton armor, a ceremonial beard wig, and a cowl made from the head of a jaguar. Gold-and-jade necklaces dangled across his naked chest. In the palace he found 6-Monkey and her husband, the king of Red and White Bundle. Both were mortally wounded. In Pohl's account, 8-Deer held 6-Monkey as she died.

Captured with the royal couple were their two sons, the elder of whom, 4-Wind, was heir to the throne. Seizing him by the hair, 8-Deer forced the teenager to grovel before him. But he also made what seems to have been a sentimental decision: he spared the life of his lover's son. The folly of this action became apparent when 4-Wind and his brother escaped from confinement.

Seeking revenge, 4-Wind approached the Zapotec empire for help. With Zapotec backing, he linked rebels in Red and White Bundle and a host of other cities defeated by 8-Deer. They besieged Tilantongo in 1115. The battle lasted six months and ended in total defeat for Tilantongo. In a mirror image of the past, the captured 8-Deer was forced to bow to 4-Wind. He was fifty-five years old and had six official kingships and dozens of petty states under his control. Victorious and vengeful, 4-Wind personally disemboweled him. Then he married 8-Deer's daughter.

In 4-Wind's first exercise of statecraft, he abandoned the Zapotec allies who had helped him achieve the throne, aligned Tilantongo with the Toltec empire to the north, and attacked the Zapotec. Ultimately the Ñudzahui under his lead took over much of Oaxaca, forcing the Zapotec states to pay tribute. The empire he established, far bigger than 8-Deer's, lasted until the fifteenth century, when the Mexica invaded. And then came Cortés.

## WHEELED INTERLUDE

As Matthew Stirling and his team were dodging ticks and unearthing stelae in Tres Zapotes, they found a cache of fifteen upside-down pottery bowls tucked into the ground six feet below the surface. The bowls protectively covered thirty-five toy-size, decorated figurines and twelve small, painted clay discs. Among the figurines were two dogs and a jaguar, each of which had thin tubes joining its two front feet and its two back feet. The discs lay beside them. Similar finds have been made further north, near Mexico City.

In the 1980s I saw the Tres Zapotes animals, or ones like them, at a museum in the Yucatán Peninsula. I was there with an Italian engineer whom I had met by chance a few hours before. Well before me, the engineer figured out the significance of the tubes between the figurines' feet. "Those are for axles," he said. "And those"—pointing to the discs—"must be the wheels." Looking at the little figures, it seemed obvious that they had been equipped with wheels in precisely the form he suggested.



The engineer scrunched up his face with incredulity. Tres Zapotes dated back to at least 1000 B.C. So the Olmec and their successors must have had the wheel for more than two thousand years. "Why didn't they use it for anything other than little toys?" he asked in Italian. "How could they not have understood that you could make bigger wheels and put them on carts? *Hanno fatto proprio una stupidaggine, quei tipi.*"

The word *stupidaggine* (an absurdity), similar enough in Italian and Spanish, rang out in the room, drawing stares. The engineer seemed not to care. He looked positively offended at the Olmec failure to see the world in the same way as a contemporary European engineer.

I'm giving my acquaintance a hard time, but his bafflement was easy for me to understand. In Mesopotamia, the wheel dates back to at least the time of Sumer. It was a basic part of life throughout Eurasia. Chariot wheels, water wheels, potter's wheels, millstone wheels—one can't imagine Europe or China without them. The only thing more mysterious than failing to invent the wheel would be inventing the wheel and then failing to use it. But that is exactly what the Indians did. Presumably countless thousands of people rolled the toylike figurines back and forth. How could none of them have thought of making their wheels bigger and more useful?

Some reasons are apparent. Because of the Pleistocene extinctions, the Americas lacked animals suitable for domestication into beasts of burden; without animals to haul carts, individuals on rough terrain can use skids almost as effectively. Even with animals, though, the Olmec would not have had much use for wheeled vehicles. Their country is so wet and boggy that Stirling's horses sank to their chests in mud; boats were a primary means of transportation until recently. In addition one might note that Mesoamerican societies were not alone in their wheel-blindness. Although Mesopotamia had the wheel in about 4000 B.C., nearby Egypt did not use the wheel until two thousand years later, despite being in close contact. Still, none of this explains why no Mesoamerican society ever used wheels to make ceramics and grind maize. After all, every society in Eurasia eventually employed pottery wheels and mill wheels.

A better answer might be one implicit in Robert Temple's book, *The Genius of China*, a history of Chinese science and technology published in 1998. According to Temple, the Chinese invented the moldboard plow by the third century B.C. Made of cast iron, the plowshare was shaped like a V, with the blade carving into the ground and the two arms arcing away like gull wings. Because the arms were curved, they turned the earth away from the blade, which both reduced friction and more effectively plowed the soil. (The "moldboard" is the curved plowshare; the name comes from *mold*, the Old German word for soil.)

The design of the moldboard plow is so obvious that it seems incredible that Europeans never thought of it. Until the Chinese-style plow was imported in the seventeenth century, farmers in France, Germany, Italy, the Netherlands, and other states labored to shove what amounted to a narrow slab of metal through the earth. "The increased friction meant that huge multiple teams of oxen were required, whereas Chinese plows could make do with a single ox," Temple explained. The European failure to think up the moldboard, according to science historian Teresi, was "as if Henry Ford designed the car without an accelerator, and you had to put the car in neutral, brake, and go under the hood to change speed. And then we did this for 2,000 years."

European agricultural production exploded after the arrival of the moldboard plow. The prosperity this engendered was one of the cushions on which the Enlightenment floated. "So inefficient, so wasteful of effort, and so utterly exhausting" was the old plow, Temple wrote, "that this deficiency of plowing may rank as mankind's single greatest waste of time and energy." Millions of Europeans spent centuries behind the plow, staring at the blade as it ineffectively mired itself in the earth. How could none of them have thought of changing the design to make the plow more useful?

The complexity of a society's technology has little to do with its level of social complexity—something that we, in our era of rapidly changing, seemingly overwhelming technology, have trouble grasping. Every society, big or little, misses out on "obvious" technologies. The lacunae have enormous impact on people's lives—imagine Europe with efficient plows or the Maya with iron tools—but not much effect on the scale of a civilization's endeavors, as shown by



both European and Maya history. The corollary is that widespread and open trade in ideas is the best way to make up for the lacunae. Alas, Mesoamerica was limited in this respect. Like Europe, it was an extraordinarily diverse place with a shared cultural foundation. But where Europe had the profoundly different civilizations of China and Islam to steal from, Mesoamerica was alone in the world.

Or seemed to be, anyway.

8

# *Made in America*

## ENTERING THE WATER

At some point, Chak Tok Ich'aak must have realized that January 14, 378 A.D., would be his last day on earth. The king of Mutal, the biggest and most cosmopolitan city-state in the Maya world, he lived and worked in a sprawling castle a few hundred yards away from the great temples at the city's heart. (Now known as Tikal, the ruins of Mutal have become an international tourist attraction.) Audience seekers entered the castle through a set of three richly carved doors in its eastern wall. Inside was a receiving room where petitioners waited for the king's attention. An inner portal led to a torch-lit chamber, where Chak Tok Ich'aak, flanked by counselors and minions, reclined on an ornate bench. On that bench is, quite possibly, where he met his fate.*

Like most Maya rulers, Chak Tok Ich'aak spent a lot of his time luxuriating in his court while dwarf servants attended to his whims and musicians played conch shells and wooden trumpets in the background. But he also excelled at such regal duties as performing ritual

*Chak Tok Ich'aak's name, like most Maya names, is easier to pronounce than it looks. In most transliterations, all letters are pronounced much as they are in English, except that x is "sh." Thus the small ruin of Xpuhil is "Shpoo-heel." The only difficulty is the glottal stop, the constriction of the throat that occurs when someone with a classic Brooklyn accent pronounces "bottle." In Maya, the glottal stop is indicated by an apostrophe, as in Ich'aak. Chak Tok Ich'aak, incidentally, meant something like "Great True Jaguar Claw."

Mutal (modern Tikal) and the huge city-empire of Teotihuacan had trade relations—peaceful, so far as is known—that dated back to 200 A.D. Matters abruptly changed in January 378, when a force led by the Teotihuacan general Siyaj K'ak' arrived in the court of the Mutal king Chak Tok Ich'aak. As depicted on a painting wrapped around a Mutal vase, the

public dances, sending out trade expeditions in search of luxury goods, and fighting wars—a celebratory stela has Chak Tok Ich'aak personally stomping a manacled POW. In another portrait, a bas-relief, the king is depicted as an alert man with a long breechclout and a jeweled mass of necklaces, bracelets, anklets, and pendants clicking and clattering about his person. Towering a foot over his skull was an elaborate headdress in the shape of a bird of prey, complete with swirling plumage. Like most Maya art, the portrait is too stylized to regard as a naturalistic rendering. Nonetheless, it effectively makes its point: Chak Tok Ich'aak was a major historical figure.

By combining scraps of data on several inscriptions, archaeologists have calculated that Chak Tok Ich'aak probably acceded to the throne in 360 A.D. At the time, the Maya realm consisted of sixty or so small, jostling statelets scattered across what is now northern Belize and Guatemala and the Yucatán Peninsula. Mutal was older and wealthier than most, but otherwise not strikingly different. Chak Tok Ich'aak changed that. During the eighteen years of his reign, the city acquired diplomatic stature and commercial clout; its population grew to perhaps ten thousand and it established trade contacts throughout Mesoamerica. As it prospered, Mutal attracted considerable attention—which, in the end, may have been the king's undoing.

Marching toward him that January day was an armed force from Teotihuacan, 630 miles to the west. Already in control of most of central Mexico, Teotihuacan was looking for new lands to dominate. Leading the expedition was one Siyaj K'ak', apparently a trusted gen-

foreign soldiers, shown with bundles of spears and atlatls, marched away from a Teotihuacan-style building (above) and confronted the lightly clad Mutal king on the steps of his palace (near left). The outcome of the meeting—Chak Tok Ich'aak's death—may be hinted at in the final image (far left), in which longhaired Maya pay their respects to an empty pyramid.

eral or counselor to the ruler of Teotihuacan. Four Maya cities along Siyaj K'ak''s path recorded his progress in murals, panel paintings, and stelae. Texts and images depict the Teotihuacanos as gaudily martial figures with circular mirrors strapped to their backs and squared-off helmets sweeping protectively in front of the jaw. They were bare-chested but wore fringed leggings and heavy shell necklaces and high-strapped sandals. In their hands were atlatls and obsidian darts to throw with them. Painted panels in one city show Maya soldiers in jaguar uniforms rushing to attack the visitors, but in fact it seems unlikely that any of the small settlements between Teotihuacan and Mutal would have dared to harass them.

No detailed description of the encounter between Siyaj K'ak' and Chak Tok Ich'aak exists, but it is known that discussion did not go on for long. They two men met on January 14, 378 A.D. On that same day Chak Tok Ich'aak "entered the water," according to an account carved on a later stela. The Maya saw the afterworld as a kind of endless, foggy sea. "Entering the water" was thus a euphemism on the order of "passed on to a better place." Readers of the stela would understand that Chak Tok Ich'aak's old heart had quietly stopped beating after Siyaj K'ak' or one of his troops slipped a blade into it. Likely the rest of his family perished, as well as anyone else who objected. In any case no one seems to have complained when Siyaj K'ak' established a new dynasty at Mutal by installing the son of his Teotihuacan master on the vacant throne.

Chak Tok Ich'aak's death began a tumultuous period in Mesoamer-

ican history. The new, Teotihuacan-backed dynasty at Mutal drove the city to further heights of power and prestige. Inevitably, its expansion was resented. A northern city-state, Kaan (now known as Calakmul), conscripted an army from its client states and launched a series of attacks. The ensuing strife lasted 150 years, spread across the Maya heartland, and resulted in the pillage of a dozen city-states, among them both Mutal and Kaan. After suffering repeated losses, Mutal unexpectedly defeated the superior forces of Kaan, possibly killing its king to boot. The beaten, humiliated Kaan lost the support of its vassals and was reduced to penury.

Mutal once again reclaimed its heritage from imperial Teotihuacan. But its triumph, though long sought, was short-lived. In one of archaeology's most enduring mysteries, Maya civilization crumbled around it within a century. After a final flash of imperial splendor, the city joined Kaan and most central Maya cities in obscurity and ruin. By about 900 A.D., both Mutal and Kaan stood almost empty, along with dozens of other Maya cities. And soon even the few people who still lived there had forgotten their imperial glories.

## "GETTING ALONG WITH NATURE"

Why did the Maya abandon all their cities?

"No words are more calculated to strike dismay in the hearts of Maya archaeologists," the Maya archaeologist David Webster confessed in 2002. Webster, a researcher at Pennsylvania State University, admitted that during his "incautious younger years" he often told fellow airplane passengers that he was flying to work "at some ancient Maya center. Then, with utter predictability, [would come] the dreaded question. Nowadays, older and wiser, I usually mutter something vague about 'business' and then bury my nose in the airline magazine."

One reason Webster avoided the question is its scope. Asking what happened to the ancient Maya is like asking what happened in the Cold War—the subject is so big that one hardly knows where to begin. At the same time, that very sweep is why the Maya collapse has fascinated archaeologists since the 1840s, when the outside world first learned of the abandoned cities in Yucatán. Today we know that the



fall was not quite as rapid, dramatic, and widespread as earlier scholars believed. Nevertheless, according to Billie Lee Turner, a geographer at Clark University, in Worcester, Massachusetts, it was unique in world history. Cultures rise and fall, but there is no other known time when a large-scale society disintegrated—and was replaced by *nothing*. "When the Roman Empire fell apart," he said, "Italy didn't empty out—no cities, no major societies—for more than a thousand years. But the Maya heartland did just that." What happened?

In the 1930s, Sylvanus G. Morley of Harvard, probably the most celebrated Mayanist of his day, espoused what is still the best-known theory: The Maya collapsed because they overshot the carrying capacity of their environment. They exhausted their resource base, began to die of starvation and thirst, and fled their cities en masse, leaving them as silent warnings of the perils of ecological hubris.

When Morley proposed his theory, it was little more than a hunch. Since then, though, scientific measurements, mainly of pollen in lake sediments, have shown that the Maya *did* cut down much of the region's forest, using the wood for fuel and the land for agriculture. The loss of tree cover would have caused large-scale erosion and floods. With their fields disappearing beneath their feet and a growing population to feed, Maya farmers were forced to exploit ever more marginal terrain with ever more intensity. The tottering system was vulnerable to the first good push, which came in the form of a century-long dry spell that hit Yucatán between about 800 and 900 A.D. Social disintegration followed soon thereafter.

Recounted in numberless articles and books, the Maya collapse has become an ecological parable for green activists; along with Pleistocene overkill, it is a favorite cautionary tale about surpassing the limits of Nature. The Maya "were able to build a complex society capable of great cultural and intellectual achievements, but they ended up destroying what they created," Clive Ponting wrote in his influential *Green History of the World* (1991). Following the implications of the Maya fall, he asked, "Are contemporary societies any better at controlling the drive toward ever greater use of resources and heavier pressure on the environment? Is humanity too confident about its ability to avoid ecological disaster?" The history of these Indians, Ponting and others have suggested, has much to teach us today.

Curiously, though, environmentalists also describe Native Ameri-

can history as embodying precisely the opposite lesson: how to live in a spiritual balance with Nature. Bookstore shelves groan beneath the weight of titles like *Sacred Ecology, Guardians of the Earth, Mother Earth Spirituality,* and *Indigenous Traditions and Ecology: The Interbeing of Cosmology and Community.* So strongly endorsed is this view of Native Americans that checklists exist to judge whether books correctly depict their environmental values. The Native Cultures Authenticity Guideline, for instance, assesses the portrayal of the "Five Great Values" shared by all "the major Native cultures" (including, one assumes, the Maya), one of which is "Getting Along with Nature"—"respecting the sacred natural harmony of and with Nature." To be historically accurate, according to the guidelines, major native cultures must be shown displaying "a proper reverence for the gift of life."

Indians as poster children for eco-catastrophe, Indians as green role models: the two images contradict each other less than they seem. Both are variants of Holmberg's Mistake, the idea that Indians were suspended in time, touching nothing and untouched themselves, like ghostly presences on the landscape. The first two sections of this book were devoted to two different ways that researchers have recently repudiated this perspective. I showed that they have raised their estimates of indigenous populations in 1492, and their reasons for it; and then why most researchers now believe that Indian societies have been here longer than had been imagined, and grew more complex and technologically accomplished than previously thought. In this section I treat another facet of Holmberg's Mistake: the idea that native cultures did not or could not control their environment. The view that Indians left no footprint on the land is an obvious example. That they marched heedlessly to tragedy is a subtler one. Both depict indigenous people as passively accepting whatever is meted out to them, whether it is the fruits of undisturbed ecosystems or the punishment for altering them.

Native Americans' interactions with their environments were as diverse as Native Americans themselves, but they were always the product of a specific historical process. Occasionally researchers can detail that process with some precision, as in the case of the Maya. More often one can see only the outlines of history, as in the reconfiguration of the eastern half of the United States. These two paradig-



matic examples are the subjects I turn to now. In both, Indians worked on a very large scale, transforming huge swathes of the landscape for their own ends. Sifting through the evidence, it is apparent that many though not all Indians were superbly active land managers—they did not live lightly on the land. And they *do* have lessons to teach us, but they are not what are commonly supposed.